

NEW, RARE OR LITTLE KNOWN SCOMBROIDS. No. 1.

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The present paper is one of a series now in preparation, which will be intended to give accounts of the more interesting *Scombroids* contained in the collection of the The Academy of Natural Sciences of Philadelphia. While a few of the species appear to be new, others are rare, and some are of value in establishing identifications of older naturalists. I have framed complete descriptions of some species which have at all times needed elucidation, while a number of others are supplemented with notes. Changes in nomenclature which appear necessary are given. In such cases some are due entirely to a rigid adherence to the original orthography. In the introduction of several new subgenera it may be remembered that where transitional forms occur, like those in the older conception of *Caranx*, the better defined groups, possibly of different lines of descent, had at least best be indicated even if only provisionally.

SCOMBRIDÆ.

SCOMBRINÆ.

Subgenus SCOMBER Linnaeus.

Scomber scombrus Linnaeus.

Syst. Nat., Ed. X, 1758, p. 297. In Oceano Atlantico.—Bonaparte, Cat. Met. Pesc. Europ., Napoli, 1846, p. 73.

Five examples from Italy. Bonaparte Coll. (No. 386.). Dr. T. B. Wilson.

Subgenus PNEUMATOPHORUS Jordan and Gilbert.

Scomber kanagurta Rüppell.

Atl. Reis. Nördl. Af., Fisch., 1828, p. 93. Gomfuda. [Red Sea.]—Fowler, Journ. Acad. Nat. Sci. Phila., XII (2), 1904, p. 506, Pl. 12, upper figure.

Head $3\frac{7}{10}$; depth 4; D. VIII–I, 11, 5; A. I, 11, 5; P. I, 20; V. I, 5; scales about 148 in lateral series to base of caudal; about 13 scales in a transverse series between origin of second dorsal and lateral line; about 24? scales between lateral line and origin of anal; width of head 2 in its length; depth of head $1\frac{1}{4}$; snout $3\frac{1}{2}$; eye $3\frac{1}{2}$; maxillary $2\frac{1}{2}$; mandible $1\frac{1}{4}$; interorbital space $3\frac{2}{3}$; depressed dorsal $1\frac{1}{4}$; base of second dorsal $2\frac{1}{10}$; base of anal $2\frac{1}{10}$; pectoral 2 (damaged); ventral $2\frac{1}{2}$; least depth of caudal peduncle $8\frac{1}{4}$.

Body elongate, rather deep, compressed, and greatest depth near middle of its length. Caudal peduncle small, its width $\frac{2}{3}$ its depth.

Head triangular, deep, and compressed, and profiles evenly though slightly convex above and below. Snout long, conic, sides becoming compressed, and top of head flattened anteriorly. Eye high, nearly touching upper profile, and a little anterior. Mouth moderate, its gape reaching about half way in space between tip of snout and front rim of pupil. Preorbital long, of about even width, and groove extending about opposite middle of eye. Maxillary when exposed reaching front rim of orbit, but when mouth is closed reaching front rim of pupil, and entirely concealed posteriorly by preorbital. Teeth small, conic, rather few, and uniserial in jaws. Tongue small, anterior, elongate, tip rounded and free. No teeth on roof of mouth. Nostrils lateral, and space between each moderate. Anterior circular, about midway between tip of snout and front of eye. Posterior a short vertical slit. Interorbital space broad, flattened, or only slightly concave in middle. Top of head, posterior to eyes, convex.

Gill-opening large, its posterior margin forming a vertical undulation leaving a large flap at lower corner, and extending forward till nearly opposite posterior nostril. Shoulder girdle furnished with two broad fleshy processes with a rather broad space between. Isthmus long and thin, but without a sharp edge. Rakers 13+23, long, though a little shorter than longest filaments, or about equal to space between tip of snout and posterior nostril. Rakers compressed, rather attenuate, and furnished with a series of fine pointed and rather flexible bristles on each inner edge. Filaments longest on middle of ceratobranchial. Pseudobranchiæ about equal to space between tip of snout and anterior nostril. Air-bladder rather large.

Scales small, all narrowly imbricated, those about pectoral and just behind gill-opening enlarged. Scales below second dorsal small. Cheeks and top of head scaly, rest of head naked. Lateral line concurrent with back till after first dorsal, then inclined straight to base of caudal. A short keel at base of each caudal lobe laterally. Pectoral without flap, but with a ridge along scales above to its tip. Soft dorsal and anal covered with minute scales, other fins except pectoral, naked. Adipose eyelid large, leaving only middle third of eye exposed.

Dorsal spines slender, pungent, first two close together, third longest, and others graduated to last which is short. Depressable in a groove which extends well beyond its tip when fin is depressed, and origin falling a little nearer base of soft dorsal than tip of snout, or about over first $\frac{2}{3}$ of pectoral. Second dorsal small, inserted nearer origin of pec-

toral than base of caudal, and anterior rays elevated. Spine weak. Finlets of both dorsal and anal similar, at equal distances, and last longest. Anal similar to soft dorsal, inserted about midway between origin of pectoral and base of caudal, or a little behind origin of soft dorsal. Pectoral high, small, and reaching beyond middle of base of spinous dorsal. Ventral low, inserted a trifle behind(?) origin of pectoral. Caudal small, deeply emarginate.

Color when fresh in arrack, blue-black above, with many round deep or darker spots than body-color, and area above well separated from lower surface of body by a sharp line of demarcation which reaches lateral line below first finlets. Sides of head, trunk, and caudal peduncle, together with all of lower surface of body, silvery-white. Dorsal, caudal and pectoral grayish, latter especially on its outer and inside basally blackish. Ventral and anal whitish. Inside of gill-opening grayish. Peritoneum silvery.

Length $8\frac{1}{4}$ inches.

Thirty-one examples, but all of the others young. Padang, Sumatra. Coll. A. C. Harrison, Jr., and Dr. H. M. Hiller. Acad. Nat. Sci. Phila. and Stanford University. In the example described above I found a small *Leiognathus* $1\frac{2}{16}$ inches in length. It was taken from the gullet.

I provisionally adopt the name *Scomber kanagurta*, though derived from Russell's Indian fish¹ and based on that of the Red Sea by Rüppell, who subsequently described *S. chrysozonus*² and *S. microlepidotus*³ from the same place. Kner recorded the latter from the Nicobars and Hong Kong,⁴ and Bleeker from Pinang.⁵ Dr. Steindachner considers both identical with *S. loo*,⁶ and Day⁷ united all three with *S. kanagurta*, *S. moluccensis*,⁸ and *S. reani*,⁹ though Dr. Klunzinger separated *S. microlepidotus*, retaining *S. kanagurta* and *S. chrysozonus* as distinct.

Dr. Meek records *microlepidotus* from Aden.¹⁰ One of his examples now in the Museum of Stanford University I have examined. It has exceedingly long gill-rakers, the longest almost equal to snout and one-

¹ *Kanagurta* Russell, *Fishes of Coromandel*, II, 1803, p. 28, Pl. 136.

² *Neue Wirbelthiere, Fisch.*, 1835, p. 37, Pl. 11, fig. 1. Massaua. [Red Sea.]

³ *L. c.*, p. 38, Pl. 11, fig. 2. Massaua.

⁴ *Reis. Freg. Novara, Zool.*, I, 1865, p. 143.

⁵ *Versl. Kon. Ak. Wet.*, XII, 1861, p. 74. [Record.]

⁶ *Sitz. Ak. Wiss. Wien*, LVII, 1868, p. 987. Rothen Meere.

⁷ *Fishes of India*, II, 1876, p. 250.—*L. c.* in *Supplement*, 1888, p. 790.

⁸ Bleeker, *Act. Soc. Sci. Ind. Neerl.* (Besch. Visch. Amboina), I, 1856, p. 40. Amboina, in mari. (M. Dnijmaer Van Twist.)

⁹ Day, *Proc. Zool. Soc. London*, 1870, p. 441.

¹⁰ *Field Mus. Pub.*, 22, Zool., Ser. I, No. 8, Nov., 1897, p. 172. [Record.]

third of orbit. In number about 30 on lower part of first arch. Shoulder girdle inside gill-opening nearly smooth and with obsolete processes. Later Dr. Meek kindly examined the other examples, which are at present in the Field Columbian Museum, and informs me that the gill-rakers are long, and numerous, longest reaching from tip of snout to middle of pupil, $2\frac{1}{2}$ to $2\frac{3}{4}$ in head.

SARDINE.

Auxis bisus (Rafinesque).

Scomber bisus Rafinesque,¹¹ Carat. Aleun. Nuov. Gen. Spec. Animal. Piant. Sicilia, 1810, p. 45, Pl. 2, fig. 1. Palermo.

Auxis bisus Bonaparte, Cat. Met. Pesc. Europ., Napoli, 1846, p. 74.

Head (measured from tip of upper jaw¹²) 4; depth about $4\frac{1}{7}$; D. XI-IV, 7, 8; A. IV, 9, 7; P. I, 20; V. I, 5; width of head $1\frac{1}{4}$ in its length; depth of head at posterior margin of preopercle $1\frac{2}{3}$; snout $4\frac{1}{3}$; orbit $5\frac{1}{2}$; interorbital space 4; base of rayed dorsal, without finlets, $3\frac{9}{10}$; base of anal, without finlets, 5; mandible $2\frac{2}{3}$; least depth of caudal peduncle 3 in snout. This example agrees with Goode's figure, except that the origin of the spinous dorsal would fall nearer the tip of the depressed pectoral than its base. Length 19 inches. Italy. Bonaparte Coll. ($\frac{76}{T}$). Dr. T. B. Wilson.

On comparison with a single example from Newport (Rhode Island) collected by Samuel Powel, and agreeing with Goode's figure,¹³ this difference is still carried out. However, the Newport example is only about $12\frac{1}{2}$ inches long, and thus it may be accounted for by age. Goode's figure does not show the keel above the base of the pectoral fin and parallel with the upper margin of the same fin. It is more distinct and extends further posteriorly in my Italian example.

I retain Rafinesque's name provisionally until more material is compared, as it is possible that the East Indian form¹⁴ may be different.

PELAMYS Walbaum.

Klein, in Walbaum, Pet. Arted. Gen. Pisc., III, 1792, p. 584. (Type here affixed is *Scomber pelamis* Linnaeus.)

Gymnosarda Gill, Proc. Acad. Nat. Sci. Phila., 1862, p. 125 (*unicolor*).

Pelamys alleteratus (Rafinesque).

Scomber alleteratus Rafinesque, Carat. Aleun. Nuov. Gen. Spec. Animal. Piant. Sicilia, 1810, p. 40. Palermo.

Scomber aletteratus Rafinesque, *l. c.*, Pl. 2, fig. 3.

¹¹ I do not know whether this name is later than *Scomber rochei* Risso, or not. Rafinesque's preface is dated April 1, 1810.

¹² Also measured in same manner for the other comparisons.

¹³ *Fishery Indust. U. S.* (Nat. Hist. Aquat. Animal, I), 1884, Pl. 92, upper figure.

¹⁴ *Scomber thazard* Lacépède, *Hist. Nat. Poiss.*, II, 1800, p. 599.—*L. c.*, III, 1800, p. 9. Vers le septième degré de latitude australe, auprès des rivages de la Nouvelle-Guinée.

Two examples from the island of St. Thomas, West Indies. They agree, and both differ from the following example in the smaller head, which is at least $3\frac{2}{3}$ in its own length and that of the trunk.

***Pelamys affine* (Cantor).**

Thynnus affinis Cantor, Journ. Ass. Soc. Bengal (Cat. Malay. Fish.), XVIII, 1850, p. 106. Sea of Pinang.—Günther, Cat. Fish. Brit. Mus., II, 1860, p. 363. (Type.)

I provisionally retain this as a distinct form from that of the Atlantic. Cantor's fish may be identical, though East Indian and Micronesian examples need comparison. The single example from Honolulu, now before me, has a larger head than the West Indian examples, being contained less than $3\frac{1}{2}$ or about $3\frac{1}{3}$ in the length of head and trunk. Dr. Günther's figure¹⁵ of an example from the Seychelles shows the pectoral high in position, its origin level with the upper margin of the eye, a character which I have not observed as yet in any examples of *Pelamys*.

***Germo germon* (Lacépède).**

Scomber germon Lacépède, Hist. Nat. Poiss., II, 1800, p. 598. No locality. *Scomber germo* Lacépède, l. c., IV, 1803, p. 1. Le grand Océan austral, improprement appelé mer Pacifique, vers le vingt-septième degré de latitude méridionale et le cent troisième de longitude. [Eastern Indian Ocean.]

Germo germon Fowler, Journ. Acad. Nat. Sci. Phila., XII (2), 1904, p. 506, Pl. 8, lower figure.

Head $3\frac{1}{2}$; depth 4; D. XIII–III, 11, 9; A. III, 11, 8; P. I, 31; V. I, 5; about 158 scales in a lateral series to base of keel on caudal peduncle; width of head $1\frac{1}{2}$ in its length; depth of head $1\frac{1}{3}$; snout $3\frac{1}{4}$; eye $5\frac{3}{8}$; maxillary $2\frac{1}{2}$; mandible $2\frac{1}{4}$; interorbital space $3\frac{1}{3}$; first dorsal spine $2\frac{1}{4}$; height of soft dorsal, measured from middle of its base, $2\frac{5}{8}$; height of anal $2\frac{5}{8}$; least depth of caudal peduncle about $10\frac{2}{3}$; width of caudal peduncle, measured across keels at their widest part, $4\frac{1}{2}$; ventral $2\frac{1}{2}$; pectoral $3\frac{3}{4}$ in body; space between tip of caudal lobes when expanded, $3\frac{1}{3}$.

Body elongate, broad, fusiform, thick, and greatest depth about middle of its length. Caudal peduncle broad, depressed, and with a broad cutaneous keel on each side.

Head deep, conic, and sides compressed. Snout conic, sides hardly compressed. Eye anterior, high, with narrow adipose eyelids, and its posterior margin midway in length of head. Mouth oblique, tip of mandible even with snout, and maxillary reaching posteriorly till opposite first third of eye. Maxillary with its upper portion slipping under preorbital, its distal expanded extremity $\frac{2}{3}$ of orbit, and with a

¹⁵ Journ. Mus. Godef. (Fische der Südsee), V, 1876, Pl. 95.

short oblique groove from its lower angle. Teeth small, conic, sharp and uniserial in jaws. Vomer with a patch of minute teeth. Palatines with similar elongate and narrow patches. Tongue free, elongate, thick, and broadly rounded in front. Anterior nostril nearer front rim of pupil than tip of snout. Posterior a vertical slit a little less than half of orbit and placed in last third of space between its front rim and anterior nostril. Interorbital space and entire top of head convex.

Gill-opening deep, broad, and extending forward till opposite space between nostrils. Rakers 5+16, compressed, pointed, and longest $\frac{3}{4}$ of orbit. Filaments numerous, long, and longest a trifle longer than eye. Pseudobranchiæ about $\frac{3}{4}$ of eye. Isthmus long, slender, and with rounded edge.

Scales minute, and cycloid, those forming small corselet greatly enlarged anteriorly. Soft dorsal and anal, together with base and middle of caudal, covered with minute elongate scales. Lateral line superior and convex at first, then extending down on middle of side of caudal peduncle to keel. Base of caudal with a low keel above and below. A narrow scaly keel above upper pectoral ray running back for about $\frac{2}{3}$ length of fin. Scales on outside basal portions of ventrals enlarged. Head naked, and cheek with long narrow horizontal bundles of muscular fibres.

Spinous dorsal depressable in a groove, anterior spine longest, enlarged, close to second, and others from third all shorter and further apart. Insertion of spinous dorsal nearly midway between front margin of eye and origin of soft dorsal, which falls well in front of that of anal, or midway between front rim of orbit and base of caudal. Finlets similar, evenly distributed, and with a long point behind. Caudal broad, lunate, strong, and lobes narrow. Pectoral long, and reaching origin of anal. Ventral small, strong, inserted a little behind origin of pectoral and fitting in a depression on belly.

Color when fresh in arrack faded probably. Back and upper surface apparently faded steel-gray. Side grayish with round whitish spots on side of abdomen. Lower surface silvery-white. Dorsal and caudal dusky-brown. Upper finlets grayish, lower whitish with a gray blotch. Anal grayish. Pectoral blackish-gray. Ventrals white with gray membranes. Keel on caudal peduncle blackish. Peritoneum pale.

Length $17\frac{1}{2}$ inches.

One example from Padang, Sumatra. Coll. A. C. Harrison, Jr., and Dr. H. M. Hiller.

This form has never been compared with the Atlantic fish, in view of

which it would seem best to retain Lacépède's name for the Indian form. Bennet records a fish from Polynesia, which may probably be identical.¹⁶

Sarda sarda (Bloch).

Scomber sarda Bloch, Naturg. Ausl. Fisch., VII (X), 1793, p. 44, Pl. 334.

Im mittländischen, als auch im atländischen Meere.

Pelamys sarda Bonaparte, Cat. Met. Pesc. Europ., Napoli, 1846, p. 74.

Head about 4; snout $3\frac{1}{2}$ in head; eye 7; maxillary 2; interorbital space $4\frac{1}{16}$. Length about $18\frac{3}{4}$ inches. Italy. Bonaparte Coll. (4). Dr. T. B. Wilson.

This single dried example is in poor condition. It agrees with Goode's figure¹⁷ so far as one is able to judge from its preservation.

Germo alatunga (Gmelin).

Scomber alatunga Gmelin, Syst. Nat. Linn., I, 1788, p. 1,330. Periodice gregarius in mari mediterraneo, migrans, edulis.

Thynnus alatunga Bonaparte, Cat. Met. Pesc. Europ., Napoli, 1846, p. 74.

Head¹⁸ $3\frac{1}{2}$; depth about $4\frac{1}{2}$; D. XV-III, 11, 9; A. III, 11?, 7; P. II, 32; V. I, 5; width of head $1\frac{3}{5}$ in its length¹⁸; depth of head, at posterior margin of eye-socket, about 2; snout $3\frac{2}{5}$; eye-socket $4\frac{1}{2}$; maxillary $2\frac{2}{3}$; interorbital space, about middle of eye-socket, 4; mandible $2\frac{1}{8}$; greatest width of caudal peduncle $7\frac{1}{8}$; pectoral $3\frac{1}{2}$ in space between tip of snout and base of caudal. Origin of spinous dorsal inserted posterior to origin of pectoral a distance about equal to $\frac{1}{2}$ length of snout. Origin of the anal would fall about opposite base of last dorsal ray. First two dorsal finlets small, especially the first which is like that of *Germo germon*.¹⁹ Ridge along upper edge of pectoral distinct nearly to tip of fin. Color obsolete though pale blotches on side of abdomen seem to be separated by oblique lines. Length 27 inches. Italy. Bonaparte Coll. ($\frac{27}{1}$). Dr. T. B. Wilson.

Goode's figure²⁰ is rather poor. It shows the origin of the spinous dorsal opposite that of the pectoral, and the pectoral fin reaching opposite the first dorsal finlet, which is also not especially smaller than the

¹⁶ Other references are probably:

Thynnus pacificus Cuvier, Hist. Nat. Poiss., VIII, 1831, p. 96. * (Based on Commerson.)

Thynnus argentivittatus Cuvier, l. c., p. 97. La mer des Indes. (M. Dussu-mier.) (Part.)

Scomber germo Bennett, Nar. Whaling Voyage, II, 1840, p. 278. Coasts of the Polynesian Islands.

¹⁷ Fishery Indust. U. S. (Nat. Hist. Aquat. Animal, I), 1884, Pl. 92, lower figure.

¹⁸ The head is here measured, for all comparisons of this species, from tip of snout.

¹⁹ Journ. Acad. Nat. Sci. Phila., XII (2), 1904, Pl. 8, lower figure.

²⁰ Fishery Indust. U. S. (Nat. Hist. Aquat. Animal, I), 1884, Pl. 95A.

others. The scales above the base of the pectoral are much larger, and those directly above in the corselet are on the contrary indicated as smaller.

I adopt Gmelin's original spelling as there is no evidence that it is an unintentional error, though of course incorrect.

Subgenus *SCOMBEROMORUS* Lacépède.

Gill-rakers 8 to 12 on first arch below angle. Dorsal spines XVII or XVIII. Teeth 30 to 40 in each jaw. Lateral line somewhat wavy and descending obliquely.

Scomberomorus argyreus sp. nov. Plate LI, lower figure.

Head 4; depth $4\frac{2}{5}$; D. XVII-III, 13, 8; A. v, 13, 8; P. 1, 20; V. 1, 5; width of head $2\frac{3}{4}$ in its length; depth of head $1\frac{2}{5}$; snout 3; orbit $4\frac{1}{2}$; maxillary $1\frac{3}{4}$; mandible $1\frac{3}{4}$; interorbital space $3\frac{3}{4}$; fourth dorsal spine $2\frac{4}{7}$; third simple dorsal ray $2\frac{1}{6}$; height of anal fin (damaged) $2\frac{1}{2}$; least depth of caudal peduncle $4\frac{3}{4}$.

Body apparently compressed, rather deep, profiles similar, and greatest depth between origins of soft dorsal and anal. From this point back tail well compressed, especially small caudal peduncle. Latter with depth about $\frac{3}{5}$ of its length, measured to end of last vertebra.

Head a little small, compressed apparently, and triangular anteriorly in profile. Snout sharply conic, equal to about $1\frac{1}{2}$ eye-diameters. In front this is formed by broad maxillaries which project well forward to form pointed tip of snout. Eye circular, a little high, and a little anterior. Mouth large and mandible even with tip of snout in front. Maxillary extending posteriorly till opposite posterior rim of orbit, slipping below orbital rim for good portion of its length, and width of distal extremity $\frac{3}{4}$ of diameter of pupil. Teeth compressed, $\frac{20-19}{20-19}$ in jaws. Tongue rather broad, obtuse, thick, small, and a little free in front. Patches of very minute teeth on vomer, palatines, and pterygoids. Tongue almost perfectly smooth, but surfaces of branchial bones in pharynx finely asperous. Nostrils distinct, well separated. Anterior circular, and a little less than diameter of pupil from front of eye. Posterior a vertical slit close in front of eye, also a little less in length than half of pupil. Interorbital space broad, and elevated convexly a little. Margin of opercle rounded posteriorly, hardly forming a blunt angle.

Gill-opening extending far forward till opposite anterior nostril. Rakers small, 1, 3 + 12, longest $\frac{2}{3}$ length of longest filament, rather far apart and not sharp. Longest filaments about $\frac{1}{4}$ of orbit. Pseudo-branchiæ well developed, though a little smaller. Isthmus long, sharp, and trenchant.

Scales not evident except in lateral line where they are very small. Tubes small. A few small scales above base of pectoral behind gill-opening, and along base of spinous dorsal. Lateral line a little high at first then sloping down gradually behind soft dorsal, wavy to base of caudal, though median, and not forming a keel. Pectoral with distinct axillary cavity. Inner ventral ray well adnate to abdomen by means of membrane. Eye without adipose eyelid, but skin on postocular region just behind eye adipose-like.

Spinous dorsal inserted well forward, about midway between tip of snout and origin of soft dorsal, a little behind that of pectoral, anterior spines longer than others, first two close together and fourth longest. Base of fin depressable in scaly sheath. Soft dorsal inserted a little in advance of that of soft anal, nearly midway between front margin of orbit and base of caudal, anterior rays highest, graduated down from first developed ones. Anal similar, also finlets. Caudal broad, deeply forked, lobes slender, their outer edges straight, and tips pointed. Pectoral broad, high, and upper rays longest, first simple and enlarged. Ventral small, inserted well behind origin of pectoral or about under its posterior base, and rays stout.

Color in alcohol, back and uppermost surface rather light brown, without traces of spots or markings. Lower surface including greater portion of sides bright silvery-white. Greater part of head with silvery. Fins pale or dilute warm olive-brown, except spinous dorsal. Latter whitish, except upper anterior portion which is blackish-brown. Pectoral with brownish, especially proximally. Ends of elevated soft dorsal and caudal lobes dusky. Ventral and anal whitish. Iris dilute brassy-white. Peritoneum pale or silvery.

Length 7 inches.

Type No. 11,400, A. N. S. P. West coast of Africa. Dr. Savage.

One example which differs from *Scomberomorus tritor* (Cuvier)²¹ in the fin radii. That fish cannot be identical with *Scomberomorus cavalla* (Cuvier) as claimed by Dresslar and Fessler²² if the original figure is correct as it shows the depth about $4\frac{1}{2}$. Bleeker's fish²³ is closer, though it may be different. This latter agrees best with *S. argyreus*. *Apodontis* may represent a distinct subgenus, as it is said to have strong conical teeth.²⁴

(*Αργύρεος*, silvered.)

²¹ *Hist. Nat. Poiss.*, VIII, 1831, p. 129, Pl. 218.

²² *Bull. U. S. Fish Comm.*, VII, 1887 (1889), p. 444.

²³ *Nat. Verh. Hol. Maat. Wet. Haarlem*, XVIII, 1863, p. 72.

²⁴ *Proc. Zool. Soc. London*, 1, 1830-1, pp. 146, 169.

Scomberomorus guttatus (Schneider).

Scomber guttatus Schneider, Syst. Ichth. Bloch, 1801, p. 23, Pl. 5. Ad Tranquebariam pelagius inter saxa.

Head $4\frac{2}{3}$; depth $4\frac{1}{3}$; D. XVII-iv. 15, 8; A. v, 14, 9; P. i, 20; V. i, 5; width of head 2 in its length; depth of head $1\frac{1}{3}$; snout $2\frac{1}{4}$; eye 5; maxillary $1\frac{1}{3}$; mandible $1\frac{2}{3}$; interorbital space 3; least depth of caudal peduncle 4; pectoral $1\frac{7}{10}$; ventral about 3. Gill-rakers 2+9, short, barely half length of filaments. Color when fresh in arrack deep slaty-glaucous above, side and lower surface of body silvery-white. Back and upper portion of side with numerous round spots or elongate blotches of deep glaucous, much deeper than ground color. First dorsal black. Soft dorsal, caudal and pectoral grayish. Lower finlets, ventral and anal whitish, and upper finlets somewhat grayish. Length $13\frac{3}{8}$ inches.

Four examples, two of which are young. The latter have the body plain-colored, hardly evidences of spots or only a few ill-defined darker blotches. Spinous dorsal deep black, except white posterior base. Lateral line not forming a scaly keel on side of caudal peduncle, and no keels at bases of caudal lobes. Adult with 27 teeth in upper jaw.

Padang, Sumatra. Coll. A. C. Harrison, Jr., and Dr. H. M. Hiller. Acad. Nat. Sci. Phila. and Stanford University.

Scomberomorus regalis (Bloch).

Scomber regalis Bloch, Naturg. Ausl. Fisch., VII (X), 1793, p. 38, Pl. 333. (Based on Pater Plunier's MS., and evidently from the West Indies.)

Head $4\frac{1}{3}$; depth $4\frac{1}{3}$; D. XVII-v, 12, 8; A. v, 14, 8; eye 5 in head; snout $2\frac{3}{4}$; maxillary $1\frac{1}{3}$; interorbital space $3\frac{2}{3}$. Gill-rakers 3+12. Teeth in jaws $\frac{18-17}{15-15}$. Maxillary reaching posterior margin of eye. A dark longitudinal line just below dark color of back toward caudal peduncle where it becomes obsolete. Iris pale brassy. Lobe of soft dorsal above blackish-brown. Length $9\frac{3}{4}$ inches. One example from San Domingo, West Indies. Prof. W. M. Gabb.

SIERRA subgen. nov.

Type *Cybiium cavalla* Cuvier.

Less than 8 gill-rakers below angle, on first arch. Dorsal spines XIV or XVI. Teeth about 30 in each jaw. Lateral line abruptly descending below soft dorsal.

(*Sierra* [Spanish], saw. Applied to these fishes by the Mexicans, in the United States corrupted into Cero.)

Scomberomorus cavalla (Cuvier).

Cybiium cavalla Cuvier, Règne Animal, II, Ed. II, 1829, p. 200. (Based on *Guarapucu* Marcgrave, Hist. Nat. Brasil., 1648, p. 178. Brazil.)

Cybiium acervum Cope, Trans. Amer. Philos. Soc., XIV, 1871, p. 472.

Head $4\frac{2}{3}$; depth $4\frac{1}{3}$; D. XV-vi, 12, 9; A. v, 14, 8; snout $2\frac{3}{8}$ in head;

eye $5\frac{1}{3}$; maxillary $1\frac{2}{3}$; interorbital space $3\frac{1}{3}$; pectoral $1\frac{1}{2}$. Gill-rakers $1+7$ on first arch. Lobe of soft dorsal deep brown. Length 15 inches. San Domingo, West Indies. Prof. W. M. Gabb. Also a smaller example with same data.

The three examples recorded from St. Martins, West Indies, are also identical. They have depth 4 to $4\frac{1}{2}$, D. XV (one XVI), and rakers $2+6$ (one 7), more or less rudimentary.

LEMNISOMIDÆ fam. nom. nov.²⁵

LEMNISOMINÆ subfam. nom. nov.

LEMNISOMA Lesson.

Voy. Aut. Mond. Coquille, Zool., July 25, 1827, p. 160 (*thyrsitoides*).

Gempylus Cuvier, Règne Animal, II, Ed. II, 1829, p. 200 (*serpens*).

Lemnisoma serpens (Cuvier). Plate LI, upper figure.

Gempylus serpens Cuvier, l. c. (Based on *Serpens marinus*, etc. Sloane

Voy. Jam., I, 1707, p. 26, Pl. 1, fig. 2. About the Tropick of Cancer.)

Gempylus ophidianus Poey, Mem. Hist. Nat. Cuba, II, 1856-58 (1861), p. 246, Pl. 18, fig. 1 (head). Cuba.

Head (damaged) about 5; depth about 17; D. XXXII, III, 10, 6; A. I, II, 9, 7; P. II, 12; V. I, 4; width of head about $5\frac{1}{2}$ in its length; depth of head about $3\frac{1}{2}$; mandible about $1\frac{2}{3}$; pectoral about $2\frac{1}{3}$; lower caudal lobe (damaged) about $1\frac{5}{6}$; snout about $1\frac{9}{10}$ in head, measured from tip of upper jaw; eye about $5\frac{1}{3}$; maxillary about $1\frac{1}{3}$; interorbital space about 7 (damaged); least depth of caudal peduncle about 8; seventh dorsal spine about $4\frac{1}{2}$.

Body very elongate, strongly compressed, and trunk of nearly uniform depth. Caudal peduncle compressed, its least depth about $\frac{4}{5}$ its length, measured from base of last lower finlet.

Head compressed, attenuate, and profiles of both jaws nearly straight, upper a little concave above nostrils. Snout long, conic, and pointed. Eye apparently circular, high, close to upper profile, and its anterior margin a little posterior in middle of length of head. Mouth large, not completely closing, and large mandible with a rather large hard, conic, fleshy point produced well beyond in front, tip of upper jaw fitting in lower anteriorly. Maxillary reaching a little beyond front rim of orbit, slipping below thin edge of preorbital for good portion of its length, and its distal expanded extremity about equal to infraorbital space. Teeth $\frac{17-111-15}{17-17}$, compressed, uniserial, broad, sharp pointed, and three medianly in front of upper jaw enlarged and posteriorly along edges barbed. A series of small irregular teeth on palatines, none on vomer. Tongue long

²⁵ *Lemnisoma* Lesson has priority over *Gempylus* Cuvier if identical, thus the above changes. Their generic status, however, needs investigation. It may also be noted that *Gempylina* Jordan and Evermann must give place to *Lemnisominae*.

slender, smooth, and united to floor of mouth by membrane, only tip free. Nostrils small, far apart. Anterior circular, high on side of snout, and about $\frac{2}{3}$ of an eye-diameter before front rim of orbit. Posterior a small vertical slit in last third of space between anterior and front rim of orbit. Interorbital space a little broad and somewhat convex.

Gill-opening large. Rakers rather few small irregular obsolete pricks. Filaments about $\frac{2}{3}$ of orbital diameter. Pseudobranchiæ well developed, but smaller. Pharyngeal teeth in elongated series and thorn-like.

Narrow thin elongate small scales only evident on caudal peduncle and base of caudal. Lateral line double, and originating opposite base of first dorsal spine. Upper branch extends high along back till opposite anterior elongated dorsal rays, where it suddenly becomes incomplete. Lower branch, till it becomes median, along side well behind pectoral, then continuing straight to base of caudal.

Origin of spinous dorsal about an eye-diameter, or possibly a trifle more, in advance of that of pectoral, and base of fin about equal to $\frac{1}{4}$ of total length of specimen. Spines placed rather far apart, slender, longest about $\frac{2}{3}$ to $\frac{3}{4}$ of depth of body, and margin of fin not notched, membranes forming an entire edge. Posteriorly spines become shorter, so that soft dorsal is distinct. Entire fin depressable in a groove. Soft dorsal inserted near last $\frac{2}{3}$ of total length, elevated anteriorly, and rays graduated from second simple one which is longest. Finlets slender, rather high, and posterior margin of each adnate to back by a membrane. A small rudimentary spine a short distance in front of soft anal. Soft anal inserted opposite and similar to soft dorsal. Caudal forked, rudimentary rays strong, and with a slight elevation laterally on base at terminus of lateral line. Pectoral small, falcate, and upper rays much longer than others. Ventral rudimentary, inserted a little behind base of pectoral, and spine strong though short.

Color in alcohol brown with traces of leaden-silvery, and back apparently brown. Top of head brown. Dorsal brown, caudal brownish, and anal pale brown. Pectoral brownish, a little darker basally. Iris dull slaty. Peritoneum pale brownish.

Length $31\frac{3}{4}$ inches.

One example from San Domingo, West Indies. Prof. W. M. Gabb. This rare species is only known, since originally described, from the accounts by Poey and Lütken. The Polynesian form, *Gempylus coluber* Cuvier,²⁶ considered identical by Dr. Günther,²⁷ needs comparison.

²⁶ *Hist. Nat. Poiss.*, VIII, 1831, p. 155, Pl. 221.

²⁷ *Journ. Mus. Godefr.* (Fische der Südsée), IV, 1875, p. 106, Pl. 68, fig. B.

Dr. Günther's figure does not indicate the maxillary reaching the front of the orbit, and the small scales on the caudal peduncle and base of the caudal. It shows what is probably intended for the lateral line originating apparently opposite and level with the base of the pectoral, but no dorsal branch is indicated. Poey also pointed out that the example figured by Valenciennes,²⁸ if correct, must be different from *L. serpens*.

Dr. Waite has pertinent remarks concerning this species in Australian waters.²⁹

ISTIOPHORIDÆ.

Istiophorus nigricans (Lacépède).

Makaira nigricans Lacépède, Hist. Nat. Poiss., IV, 1803, p. 688. Sur un rivage de la mer voisin de la Rochelle. (M. Traversay.)



FIG. 1.—*Istiophorus nigricans* (Lacépède).

Head, figured above, of an example without data.

Tetrapturus imperator (Schneider).

Xiphias imperator Schneider, Syst. Ichth. Bloch, 1801, p. 93, Pl. 21. In mari Mediterraneo.³⁰

Tetrapturus belone Bonaparte, Cat. Met. Pesc. Europ., Napoli, 1846, p. 80.

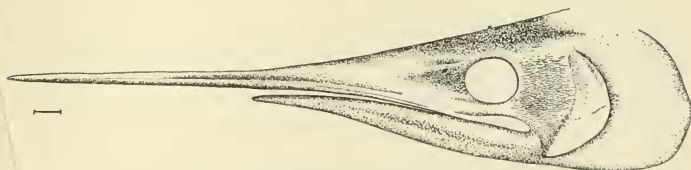


FIG. 2.—*Tetrapturus imperator* (Schneider).

A dried head, figured above, very probably belonging to the old Bonaparte collection, as it bears the number 457.

²⁸ Règne Animal, Ed. Grav., 18—, descr. Pl. 49, fig. 2.

²⁹ Rec. Austral. Mus., VIII (7), June 15, 1900, p. 199.—Also see reference, l.c., V (3), March 11, 1904, p. 198 (based on same example).

³⁰ Based on *De l'Empereur ou Poisson à Epée*, Duhamel du Monceau and de Lamarre, *Trail. Gen. Pesc.*, IV, suite de la second partie, tome III, section V, 179-82, p. 333, Pl. 25, fig. 2. Méditerranée.

XIPHIIDÆ.

Xiphias gladius Linnæus.

Syst. Nat., Ed. X, 1758, p. 248. In Oceano Europæ.—Bonaparte, Cat. Met. Pesc. Europ., Napoli, 1846, p. 80.

Two examples from Italy, Bonaparte Coll. (Nos. 367 and $\frac{39}{T}$.) Dr. T. B. Wilson. One of these is a dried skin about 3 feet in length.

LEPIDOPIDÆ.

Lepidopus caudatus (Euphrasen).

Trichiurus caudatus Euphrasen, Kön. Schwed. Akad. Wiss. Abhandl., IX, 1788, p. 48, Pl. 9, upper figure. In Oceano, ad Cap. b. Spei.

Lepidopus ensiformis Bonaparte, Cat. Met. Pesc. Europ., Napoli, 1846, p. 78.

Several examples in the Bonaparte Coll. from Dr. Wilson. Italy.

TRICHIURIDÆ.

TRICHIURUS Linnæus.

Syst. Nat., Ed. X, 1758, p. 246 (*lepturus*).

Encheliopus Klein, in Walbaum, Pet. Arted. Gen. Pisc., III, 1792, p. 583.

(Type *Trichiurus lepturus* Linnæus.)

Encheliopus Bleeker, Versl. Med. Kon. Ak. Wet. Amsterdam, (2) II, 1868, p. 292 (*haumela*).

LEPTURACANTHUS subgen. nov.

Type *Trichiurus savala* Cuvier.

Anterior anal spine enlarged, and the others all more or less distinct. Eye usually small.

(λεπτός, slender; ὀψά, tail; ἄκανθα, thorn.)

Trichiurus savala Cuvier.

Hist. Nat. Poiss., VIII, 1831, p. 184, Pl. 224. Pondichéry. (MM. Leschenault et Dussumier.)

Head $7\frac{3}{4}$; depth 18; D. about 107?; A. LXXIV? (and a few more obsolete); snout $2\frac{3}{4}$ in head, from tip of upper jaw; eye 7; maxillary $2\frac{1}{4}$; interorbital space 7. Rakers 5+8. First anal spine enlarged. Iris silvery. Body apparently uniform silvery. Fins pale. Length $14\frac{3}{8}$ inches. Singapore, Malacca. Dr. M. Burrough.

Subgenus TRICHIURUS Linnæus.

First anal spine not enlarged.

Trichiurus lepturus Linnæus.

Syst. Nat., Ed. X, 1758, p. 246. America. China.

Many examples from San Domingo and St. Martin's (West Indies), Surinam and coast of Brazil. A number are small, and the largest is nearly 3 feet long. They range about as follows: Head $6\frac{1}{2}$ to $7\frac{3}{4}$; depth $12\frac{1}{2}$ to $16\frac{1}{4}$; D. 132 to 138; A. XCVIII to CVII; snout $2\frac{3}{8}$ to $3\frac{1}{8}$ in head, from tip of upper jaw; eye 5 to 7; interorbital space $6\frac{1}{2}$ to $7\frac{1}{8}$.

Trichiurus haumela (Forskål).

Clupea haumela Forskål, Descript. Animal., 1775, p. 72. Mochhæ. [Red Sea.]

Trichiurus haumela Fowler, Journ. Acad. Nat. Sci. Phila., XII (2), 1904, p. 506, Pl. 7, lower figure.

Head $6\frac{1}{3}$; depth 14; D. about 134; A. about CVII; P. 1, 10; width of head $5\frac{1}{2}$ in its length; depth of head $2\frac{3}{10}$; mandible $1\frac{3}{4}$; pectoral 3; depth of body at anus $2\frac{1}{2}$; snout $2\frac{3}{4}$ in head, from tip of upper jaw; eye $6\frac{1}{2}$; tip of snout to end of maxillary $2\frac{3}{4}$; interorbital space $7\frac{1}{2}$. Tip of mandible broad and rounded in front, with a small fleshy papilla. Front of upper jaw armed with 4 large barbed fangs. Front of lower jaw with 2 smaller barbed fangs. Teeth uniserial, compressed, and becoming larger posteriorly, in sides of jaw. Teeth of upper jaw concealed posteriorly by broad preorbital. Small maxillary also concealed when mouth is closed, and reaching opposite front rim of pupil. Tongue elongate, pointed, and free. Interorbital space flat. Gill-opening extending forward below nostril. Rakers 5+8, short, sharp pointed, and with rather broad bases. Isthmus trenchant. Anal fin represented by broad short truncate spines. Color in arrack, when fresh, silvery-white, upper surface leaden-gray, darker on top of head and back. Dorsal pale or whitish on lower half, and upper or marginal half grayish, becoming dusky on anterior portion of fin. Pectoral grayish. Iris pale yellowish. Peritoneum gray. Length $27\frac{1}{8}$ inches. Two examples. Padang, Sumatra. Coll. A. C. Harrison, Jr., and Dr. H. M. Hiller. Stanford University and Acad. Nat. Sci. Phila.

A small example, $16\frac{1}{2}$ inches in length, from Beirut, Syria, probably belongs to this species. It has—Head $7\frac{2}{3}$; depth 17; D. about 124; A. LXXX? (and a few obsolete); snout 3 in head, from tip of upper jaw; eye $5\frac{1}{2}$; interorbital space 7; maxillary $2\frac{1}{2}$; pectoral 3.

This species is closely related to *Trichiurus lepturus* Linnæus, differing apparently in the less numerous dorsal rays and the deeper body. *T. haumela* was recorded a number of times from India,³¹ although Day considered his *T. malabaricus*³² from Cochin as identical.

³¹ Based on Savala Russell, *Fishes of Coromandel*, I, 1803, p. 30, Pl. 41.

³² *Proc. Zool. Soc. London*, 1865, p. 20.